AFCAPS-FR-2010-0018

Feasibility Report for Experimental Inter-Service Computer-Administered Testing for the Armed Services Vocational Aptitude Battery (ASVAB)

Adjuvant Consulting Inc (ACI)

Kenneth L. Schwartz
Johnny J. Weissmuller

Strategic Research and Assessment Branch

September 30, 2008

Air Force Personnel Center
Strategic Research and Assessment
HQ AFPC/DSYX
550 C Street West, Ste 45
Randolph AFB TX 78150-4747

00110 05NOV10
PA Review: Cleared for Public Release
Air Force Personnel Center; Office of Public Affairs
PA: Ms Paige Hughes

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
Sept-30-2008	Final	July 2008-Sept2008

4. TITLE AND SUBTITLE
Feasibility Report for Experimental Inter-Service Computer-Administered Testing for the Armed Services Vocational Aptitude Battery (ASVAB)

5a. CONTRACT NUMBER
FA3089-07-P-0208

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Adjuvant Consulting INC, Kenneth Schwartz, Johnny Weissmuller

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Adjuvant Consulting INC.
8603 N. New Braunfels Ave.
San Antonio, TX. 78217

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Air Force Personnel Center
Strategic Research and Assessment Branch
Randolph AFB TX 78150

10. SPONSOR/MONITOR'S ACRONYM(S)
HQ AFPC/DSYX

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
AFCAPS-FR-2010-0018

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release, Distribution Unlimited

13. SUPPLEMENTARY NOTES

13. Abstract
Documentation of lessons learned by a contractor, Adjuvant Consulting, that provided facilities support services to conduct large scale short term experimental trials on computer testing. Provides documentation on equipment storage, power demands, test station build/tear down, test administration, data collection and storage, and overall lessons learned from the assessment period.

15. SUBJECT TERMS
Computerized testing, power demands, data collection, test administration, equipment storage

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
Unclassified					Kenneth L. Schwartz
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER *(include area code)*
U	U	U	U	13	210-565-3139

Standard Form 298 (Rev. 8-98)

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Feasibility Report for
Experimental Inter-service Computer-Administered Testing for the Armed Services Vocational Aptitude Battery (ASVAB)

Adjuvant Consulting Inc. (ACI) provided computer hardware and technical personnel to document Lessons Learned for facilities support services to conduct short-term experimental (non-recurring) trials of computerized testing. This endeavor included three experimental testing sessions. Each testing session was comprised of 100 recruits in two 3-hour sessions. Rented laptops were used to administer these sessions. ACI performed the following activities during this assessment period:

- Set up computers from bulk storage to test subject desktops including appropriate electrical connections and computer preparation for experimental testing from USB/flash drive.

- Observed and documented logistical problems and made recommendations for improving the technical delivery aspects of the experimental testing protocols.

- Provided computer corrective actions for technical problems, documented recovery methods, or alert the test content proctor for software malfunction issues.

- Secured computers before sessions, during lunch breaks, and after final testing sessions.

- Used the test content proctor‟s instructions for capturing test subject data from each experimental testing station onto a standalone proctor PC and documented procedures.

- After the third exemplar testing session, returned all experimental testing materials back to their appropriate custodian.

- Provided the final report (Lessons Learned) for review to AFPC/DPSF.

The following sections, Equipment Storage, Power Demands, Testing Station Build, Testing Station Teardown, Test Administration, and Data Collection categorize the Lessons Learned gathered throughout this assessment period.

Equipment Storage:

Equipment storage could represent a huge logistical problem. Every effort should be taken to keep the equipment (Laptops, surge protectors, and extension cords) on location at the assessment site. Equipment now becomes assessable to multiple individuals and reduces the possibility of a single point of failure.

The transport of the equipment from outside storage to the testing facility would be extremely labor intensive and would require additional implementation costs. In addition, storage of equipment at a non government facility could present unnecessary security risks that could have serious impacts on the delivery of the assessment. Every opportunity should be taken to minimize these risks to provide dependable and consistent service for each of the assessment sessions.

Onsite storage of the equipment was beneficial in this instance because it allowed Air Force Personnel at the BMT Reception Center access to move the equipment from the 2nd floor secured storage to the 1st floor testing area before the Testing Station Build step was started.

Power Demands:

The test site should be inspected in conjunction with the ***Test Station Configuration Diagram***. *(Attachment I)* This diagram contains the planned seating arrangements for each table within the test and can provide a good source of reference to determine the test facilities power requirements. A Night-Light can be used to test each wall outlet (Left and Right) to ensure each side is operational. This should be done for all the outlets within the testing configuration. If possible, determine the circuit breaker in the Electrical Box that you are using for the testing tables. This will be valuable information to have in event of a power outage. As backup, plan which outlets will be used to reroute power if an overload situation is encountered. These should be outlets on different circuit breakers than the testing tables. Determine the distance from the test tables to the alternate power source to ensure that power can be rerouted. Alternate power can also be acquired through an external power source such as a power generator. These additional steps if taken can minimize your downtime and provide the consistency needed to conduct the pilot testing and produce valid test metrics.

If the test facility is a building that provides services to others such as a reception or convention center a schedule or calendar of daily events should be acquired. This could have serious implication on the power demands of the building. What works one week can fail the next so plan ahead to ensure that power is available and uninterrupted for the duration of each testing session. A stable test environment is necessary to provide the measurements need to build an accurate test instrument.

Testing Station Build:

Test tables should be placed in conjunction with the wall power outlets to minimize the need for extension cords. Surge protectors should be at least eight (8) feet in length with no less than six (6) outlets to allow for adequate space from the table to the power source. This will render a cleaner table setup and provide good seating space for the test candidates. Each table is configured of four (4) Laptops. One wall outlet should provide adequate power for eight (8) laptops. This will allow for single tables to be linked together via surge protector, to extension cord, then to surge protector. Various combinations can be used based on the table configurations of the testing facility. However, no more than eight (8) Laptops per right or left wall receptacle are recommended. This is running heavy but should provide adequate power providing no other power drain is expected.

Setup of twenty five (25) tables and transport of nineteen (19) boxes containing Laptops, Surge Protectors, and Extension Cords from and to storage was provided by Air Force personnel on detail at the BMT Reception Center.

Testing Station Teardown:

When working with such a large number of testing stations it is helpful to make the teardown of the equipment as streamlined as possible. Therefore, it is recommended that the Laptop Case be left open (unzipped) after the test station setup is completed. The empty case should be kept near the table with the station. There should be four (4) empty and unzipped cases per table. After the candidate completes their test, the proctor should follow the shut down procedures. If this is the final test of the day then shutdown windows, close Laptop cover, and remove thumb drive. Place an empty case under each laptop to prepare for table teardown.

Test Administration:

ACI‟s role in the administration of the test was limited to the functions of Observer/Computer Information Analyst and Senior Analyst. This was achieved with great success. In addition to these tasks ACI was asked to assist as proctors. As proctors ACI answered questions the candidate‟s presented to them and assisted in managing the flow of candidates to and from the testing area. These activities were documented on the “Test Session Record” and returned to test administrators at the completion of each testing session.

It is recommended that each individual functioning as a proctor be given the opportunity to take the test themselves. This would establish familiarity with the test and assisted in providing accurate responses to the candidate‟s questions. These are a few samples of the questions asked during the administration of the test:

1. It seems like I‟ve answered these questions before. Am I taking the test again?

2. Do we get scratch paper?
3. Do I have to answer all questions?
4. Can I skip questions if I don‟t know the answer?
5. Why am I just on the first session? I‟ve be testing for a while. Seems like I should be further along.

These types of questions can be addressed as part of the greetings script given to the candidates at the start of each testing session.

Candidates had difficulty remaining awake during the morning and afternoon sessions. It is recommended that test candidates be allowed to remove their jackets and stand if fatigued. These instructions should be included in the greetings script.

Candidates were given the opportunity to take bathroom breaks. The movement of people in the testing area can be distracting to others. A constant environment must exist in each testing session to establish sensible metrics.

There were occasions when the Windows environment locked and the candidate needed assistance to continue the test. The testing program‟s restorability is extremely poor. The candidate must remember which session they were on when the computer failed. This can be problematic because test session‟s one (1) through four (4) are not presented in the same order for each occurrence of the test. The testing program should remember if the test is completed or else start from where the candidate left off.

A system hardware failure was also experienced. Having the software installed on jump drives allowed the switching of computers to be more efficient. Replacing the hardware and connecting the jump drives was all that was required to bring the testing station back online. Downtime was no more the 10 minutes. When removing a computer from service, make sure to label it. This will eliminate the risk of the bad machine being used again in any future test sessions.

A highlighted banner at the end of the exam should be displayed to convey the test is completed and wait for further instructions. The test indicated to raise your hand.

Ethnic background and race needs to be clearer and broader. Perhaps incorporate an “Other” category.

Acronyms need to be spelled out initially. This is an Information Technology (IT) aptitude test and not everyone may know what IT means.

Data Collection:

Collection of data for this experimental test was a manual process. The jump drives containing the test software were disseminated to each table containing four (4) test stations. Each test station received a unique variation of the test or Test Form ID. For example, Table one (1) received Test Form ID A01, B01, C01, and D01. The jump drives are logged-out on the ***On-***

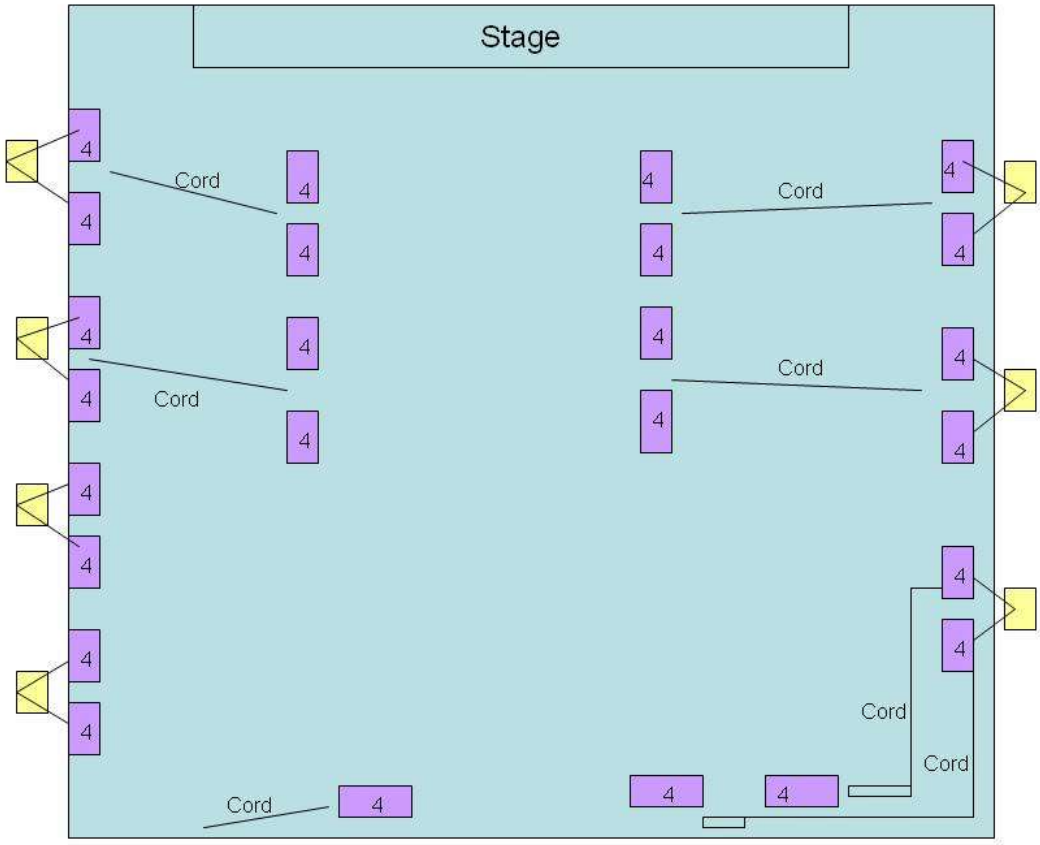
Site Jump Drive Tracking Form *(Attachment II)* as the drives are inserted into the testing stations USB port. A scannable „***Information-Communication Technology Test Development***" *(Attachment III)* document is left at each testing station for the candidate to complete. The pre-slugged "ID CODE" on the scanable document is logged with the jump drive"s Test Form ID. This links the candidate to the item responses. As the candidate completes the test the item response to each question is written to the jump drive.

After the last testing session is completed the jumps drives are collected and the test results loaded to a central depository. Since each computer is a stand-alone testing station gathering of data can only be done by physically collecting the individual jump drives. When the jump drives have been collected an automated process (GrabData_ICT.Bat) is initiated to collect the data from the jump drive. The operator inserts each jump drive and initiates the .Bat file. The jump drive is then logged-in on the ***On-Site Jump Drive Tracking Form***. This process is repeated for each jump drive used in the testing session.

This data collection step is sufficient enough to complete the task. However, a more robust interface program can be written to eliminate the „AutoPlay" and DOS window. There are many windows being initiated when the .Bat file is consecutively run one hundred (100) times. When under program control the multiple windows would be eliminated because the interface program will manage when the USB device is ready, the item responses are collected, and the device is ejected. As a final step, the operator would be asked to end the program or insert another jump drive.

Multiple documents were used to manage the testing environment. The first document was the ***Test Station Configuration Diagram***. This diagram contains the planned seating arrangements for each table within the testing environment. The second document was the ***On-Site Jump Drive Tracking Form***. This document manages the flow of jump drives from the testing station to data collection by recording the Jump Drive Number and Subject ID. It would be beneficial to combine both ***Test Station Configuration Diagram*** and ***On-Site Jump Drive Tracking Form*** into one comprehensive document. These artifacts together form a sampling matrix that the administrators could use to plan the test site and distribution of test materials. (i.e. jump drives and scanable documents) This sampling matrix could be automatically generated with built-in business rules for distribution and labeling of Test Forms. In addition, this process could also generate pre-slugged „Information-Communication Technology Test Development" documents. These automated steps would eliminate inconsistent distribution of test materials and provide a reiterative process that can be used across all projects.

Attachment I: ***Test Station Configuration Diagram.***



1. Each outlet highlighted in yellow has 2 plugs. A surge protector with 6 outlets is plugged into each one. This allows capability for 12 laptops to be plugged in. We will only plug in 4 per table so this will leave 2 outlets open per table in order to utilize extension cords to support the inner tables.

2. Materials needed: 25 Surge protectors, 7 15 - 20 ft extension cords to support 100 testing stations. Ten (10) laptops will be used for backup.

Attachment II: **On-Site Jump Drive Tracking Form.**

On-Site Jump Drive Tracking Form						
Jump Drive #	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Returned**
A01	out in	out in	out in	out in	out in	
A02	out in	out in	out in	out in	out in	
A03	out in	out in	out in	out in	out in	
A04	out in	out in	out in	out in	out in	
A05	out in	out in	out in	out in	out in	
A06	out in	out in	out in	out in	out in	
A07	out in	out in	out in	out in	out in	
A08	out in	out in	out in	out in	out in	
A09	out in	out in	out in	out in	out in	
A10	out in	out in	out in	out in	out in	
A11	out in	out in	out in	out in	out in	
A12	out in	out in	out in	out in	out in	
A13	out in	out in	out in	out in	out in	
A14	out in	out in	out in	out in	out in	
A15	out in	out in	out in	out in	out in	
A16	out in	out in	out in	out in	out in	
A17	out in	out in	out in	out in	out in	
A18	out in	out in	out in	out in	out in	
A19	out in	out in	out in	out in	out in	
A20	out in	out in	out in	out in	out in	
A21	out in	out in	out in	out in	out in	
A22	out in	out in	out in	out in	out in	
A23	out in	out in	out in	out in	out in	
A24	out in	out in	out in	out in	out in	
A25	out in	out in	out in	out in	out in	
A26	out in	out in	out in	out in	out in	
A27	out in	out in	out in	out in	out in	
A28	out in	out in	out in	out in	out in	
A29	out in	out in	out in	out in	out in	
A30	out in	out in	out in	out in	out in	
B01	out in	out in	out in	out in	out in	
B02	out in	out in	out in	out in	out in	
B03	out in	out in	out in	out in	out in	
B04	out in	out in	out in	out in	out in	
B05	out in	out in	out in	out in	out in	
B06	out in	out in	out in	out in	out in	
B07	out in	out in	out in	out in	out in	
B08	out in	out in	out in	out in	out in	
B09	out in	out in	out in	out in	out in	
B10	out in	out in	out in	out in	out in	
B11	out in	out in	out in	out in	out in	
B12	out in	out in	out in	out in	out in	
B13	out in	out in	out in	out in	out in	
B14	out in	out in	out in	out in	out in	
B15	out in	out in	out in	out in	out in	
B16	out in	out in	out in	out in	out in	
B17	out in	out in	out in	out in	out in	
B18	out in	out in	out in	out in	out in	
B19	out in	out in	out in	out in	out in	
B20	out in	out in	out in	out in	out in	
B21	out in	out in	out in	out in	out in	
B22	out in	out in	out in	out in	out in	
B23	out in	out in	out in	out in	out in	
B24	out in	out in	out in	out in	out in	
B25	out in	out in	out in	out in	out in	
B26	out in	out in	out in	out in	out in	
B27	out in	out in	out in	out in	out in	
B28	out in	out in	out in	out in	out in	
B29	out in	out in	out in	out in	out in	
B30	out in	out in	out in	out in	out in	

On-Site Jump Drive Tracking Form						
Jump Drive #	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Returned**
C01	out in	out in	out in	out in	out in	
C02	out in	out in	out in	out in	out in	
C03	out in	out in	out in	out in	out in	
C04	out in	out in	out in	out in	out in	
C05	out in	out in	out in	out in	out in	
C06	out in	out in	out in	out in	out in	
C07	out in	out in	out in	out in	out in	
C08	out in	out in	out in	out in	out in	
C09	out in	out in	out in	out in	out in	
C10	out in	out in	out in	out in	out in	
C11	out in	out in	out in	out in	out in	
C12	out in	out in	out in	out in	out in	
C13	out in	out in	out in	out in	out in	
C14	out in	out in	out in	out in	out in	
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C16	out in	out in	out in	out in	out in	
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C29	out in	out in	out in	out in	out in	
C30	out in	out in	out in	out in	out in	
D01	out in	out in	out in	out in	out in	
D02	out in	out in	out in	out in	out in	
D03	out in	out in	out in	out in	out in	
D04	out in	out in	out in	out in	out in	
D05	out in	out in	out in	out in	out in	
D06	out in	out in	out in	out in	out in	
D07	out in	out in	out in	out in	out in	
D08	out in	out in	out in	out in	out in	
D09	out in	out in	out in	out in	out in	
D10	out in	out in	out in	out in	out in	
D11	out in	out in	out in	out in	out in	
D12	out in	out in	out in	out in	out in	
D13	out in	out in	out in	out in	out in	
D14	out in	out in	out in	out in	out in	
D15	out in	out in	out in	out in	out in	
D16	out in	out in	out in	out in	out in	
D17	out in	out in	out in	out in	out in	
D18	out in	out in	out in	out in	out in	
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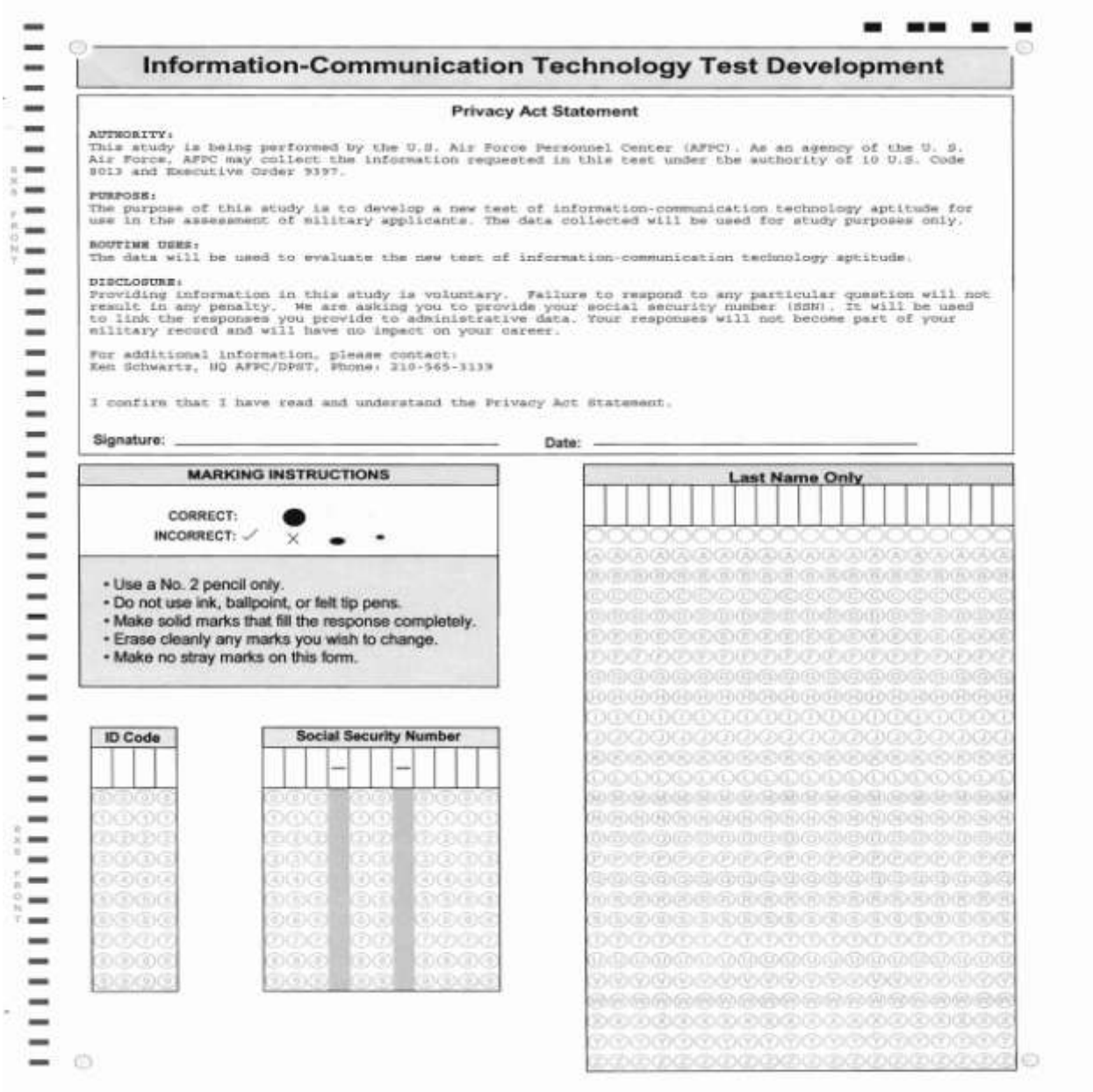
D24	out in	out in	out in	out in	out in	
D25	out in	out in	out in	out in	out in	
D26	out in	out in	out in	out in	out in	
D27	out in	out in	out in	out in	out in	
D28	out in	out in	out in	out in	out in	
D29	out in	out in	out in	out in	out in	
D30	out in	out in	out in	out in	out in	

Attachment III: Scannable '**Information-Communication Technology Test Development'** Document**.**



Information-Communication Technology Test Development

Privacy Act Statement

AUTHORITY:
This study is being performed by the U.S. Air Force Personnel Center (AFPC). As an agency of the U. S. Air Force, AFPC may collect the information requested in this test under the authority of 10 U.S. Code 8013 and Executive Order 9397.

PURPOSE:
The purpose of this study is to develop a new test of information-communication technology aptitude for use in the assessment of military applicants. The data collected will be used for study purposes only.

ROUTINE USES:
The data will be used to evaluate the new test of information-communication technology aptitude.

DISCLOSURE:
Providing information in this study is voluntary. Failure to respond to any particular question will not result in any penalty. We are asking you to provide your social security number (SSN). It will be used to link the responses you provide to administrative data. Your responses will not become part of your military record and will have no impact on your career.

For additional information, please contact:
Ken Schwartz, HQ AFPC/DPMT, Phone: 210-565-3139

I confirm that I have read and understand the Privacy Act Statement.

Signature: _____ **Date:** _____

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CORRECT: ●
INCORRECT: ✓ × ▬ •

- Use a No. 2 pencil only.
- Do not use ink, ballpoint, or felt tip pens.
- Make solid marks that fill the response completely.
- Erase cleanly any marks you wish to change.
- Make no stray marks on this form.

Last Name Only

ID Code

Social Security Number

The ID Code column is pre-slugged with a four (4) digit number to link the candidate to their item responses.